TITLE: Karabiners

DESCRIPTION

This invention concerns snap hooks, also known as karabiners, for use in climbing and other activities requiring connections to be made to ropes, cables and carrying loops for equipment.

Karabiners generally comprise a C-shaped body with its ends curved towards each other and forming a gap closed by a spring loaded gate pivotally mounted on one body end and urged into engagement with the other body end. A thimble or other locking member may be provided either on the gate or the free body end and which is movable, say slidably or along screw threading, to lock the gate in a closed position.

When unlocked, the gate of a karabiner is urged closed and a rope or loop can be snapped into the karabiner by pushing it against the gate to open it. Once the rope or loop is in the confines of the C-shaped body, the gate can spring back to its closed position, where it can be locked, if desired.

There are a number of problems associated with currently available karabiners, such as, the number of components required particularly in providing a spring-loaded gate and in the gate or body having a hooked end on which ropes or other items can snag.

An object of this invention is to provide an improved karabiner.

According to a first aspect of this invention there is provided a karabiner comprising a generally C-shaped body, with its free ends curved towards each

other and forming a gap therebetween, and a gate for closing the gap, the gate being formed of a wire member shaped and located on one free end of the body, such that it is constrained to close the gap and the other end of the gate having a slot for receiving a shaped end of the gate.

The gate is preferably formed by a wire that is bent double and has its each free ends further bent inwards towards each other to locate in a different hole on opposite sides of the free end of the body, one hole being above the other. From its locations in the free end of the body, the two strands of the wire are bent towards each other to approximately a mid-point of the gate until they overlap in a plane of the body.

At its free end the gate may be shaped by folding or bending of the wire to form a shaped end. For example, the end of the gate may be bent over sideways or the loop at the end of the gate enlarged. An alternative may be to use the loop formed where the wire is bent double to capture a shaped nut that can locate in the slot of the free end of the body. Yet again, the nut may be shaped to be slid onto the gate.

The slot preferably has from the free end of the body a first narrow part to accommodate the wire gate leading to a wide part to accommodate the shaped end of the gate. Between the wide and narrow parts of the slot a ledge may be provided. The ledge is preferably in a plane substantially normal to a longitudinal axis of the gate. Thus, when forces are applied to opposite ends of the karabiner, the ends of the body will tend to bend inwards even only to a slight extent which will cause the ledge to be angled upwardly relative to the

gate and thus help to retain the shaped end of the gate in the slot of the free end of the body.

The gate or the free end of the body may carry additional locking means for when the gate is closed. In one preferred embodiment a thimble may be provided on the gate that can be moved up the gate to overlap at least partially the free end of the body. Conveniently an outwardly screw threaded sleeve may be provided on the gate and an internally screw threaded thimble be provided on the sleeve.

In another preferred embodiment a locking ring may be mounted rotatably on the free end of the body, the ring having a slot therein, whereby in one position the gate can pass through the slot of the ring for its shaped end to locate in the slot of the free end of the body and then by rotating the ring, the slot therein is no longer accessible to the gate.

In yet another preferred embodiment, the gate may be provided with a slidable locking member that, for example, can be slid upwards when the gate is closed, the locking member having a finger or the like that extends over the opposite side of the body to that of the slot opening to prevent the gate being pushed open.

Another preferred embodiment provides a locking pin that can be inserted through the free end of the body of the karabiner and into or through the end of the gate to prevent it being pushed open. The locking pin can be on a flexible or spring-biased tab attached to the gate. Alternatively, the pin can be rotatably mounted in the slot of the free end of the body between a first position wherein a

lip on the end of the pin can pass through a loop of the wire gate and a second position wherein the lip retains the loop of the gate in the slot. The slot of the free end of the body preferably faces inwards i.e. towards the body of the karabiner. In some embodiments, however, the slot may be on the side of the free end of the body. In yet other embodiments the slot may be shaped with a part that interengages with the wire gate, especially through a loop thereof.

According to a second aspect of this invention there is provided a karabiner comprising a generally C-shaped body with its free-ends curved towards each other and forming a gap therebetween and a spring-biased gate for closing the gap located on one free end of the body and the other free end having a wire cage thereon for receiving the gate.

The gate of the second aspect of the invention may be a conventional karabiner gate, such as of metal bar or the like.

According to a third aspect of this invention there is provided a karabiner comprising a generally, C-shaped body with its free ends curved towards each other and forming a gap therebetween and a spring-biased gate for closing the gap located on one free end of the body and means for locking the gate in a closed position.

In the third aspect of the invention, the gate may be a conventional karabiner gate, such as of metal bar or the like. The locking means may be a slidable locking member that, for example, can be slid upwards on the gate and that has a finger or the like to extend over the opposite side of the body to that of the direction of opening of the gate. Alternatively a locking pin is provided on a

flexible or spring-biased tab attached to the gate, which pin can be inserted through a hole in the free end of the karabiner body and into a hole or slot of the gate when closed.

This invention will now be further described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a side view of a karabiner of the invention closed;

Figure 2 is a top plan view of the karabiner of Figure 1;

Figure 3 is a front view of the karabiner of Figure 1;

Figure 4 is a section on line AA of Figure 3;

Figure 5 is a perspective view from one side and the front of the karabiner of Figure 1;

Figure 6 is a perspective view from the rear and opposite sides of the karabiner of Figure 1;

Figures 7 to 12 are corresponding views to those of Figures 1 to 6 respectively but with the karabiner open and the section line of Figure 9 marked as BB;

Figures 13 and 14 are perspective and front views of the gate receiving free end o the karabiner of Figures 1 to 12;

Figures 15 and 16 are corresponding views to those of Figures 13 and 14 respectively with the karabiner gate closed;

Figure 17 is a section on line CC of Figure 16; and

Figures 18 to 30 show variations on the karabiner of Figure 1.

Referring to Figures 1 to 17 of the accompanying drawings, a karabiner

10 comprises a generally C-shaped body 12 having its free ends 14, 16 generally facing each other but leaving a gap 18 therebetween. Pivotally mounted on one free end 14 of the body is a gate 20. The body 12 of the karabiner where it curves top and bottom is shaped to provide locations for ropes or the like. At its top as shown there is a slight recess 21 and at the bottom the body is curved upwards at a more acute angle than at the top to provide a relatively confined location for a rope or the like.

The gate 20 is formed of wire basically bent double. The wire is bent double to form two strands 22, 24 with a loop 26 between them. The two strands 22, 24 overlie each other for a first part from the loop, so that in the karabiner they are in the plane of the body. From the end of the first part, the two strands diverge to opposite sides of the body before bending inwards to form ends 28, 30 that each locate in separate holes 32, 34 one above the other in the free end 14 of the karabiner body. The shaping of the gate and the offsetting of its pivot points urge the gate to a closed position as shown in Figures 1 to 6 of the drawings. Once pressure is applied to the gate inwardly, it will open but always spring back to a closed position when the pressure is removed. Thus, a rope or the like can be pushed into the karabiner through the gate which then snaps back to close the karabiner and retain the rope or the like therein.

The free end of the gate has located in the loop 26 a nut 36 and the free end 16 of the karabiner body has a shaped slot 38, which receives the nut 36 when the gate is closed. The slot 38 is shown in more detail in Figures 13 to 17.

The slot 38 has a first narrow part 40 open to the end of the free end 16 of the body and leading to a wide part 42 forming ledges 44 on opposite sides of the slot. The ledges are generally normal to a longitudinal axis of the gate in its closed position. The narrow part 40 accommodates the overlying strands of the gate and the wide part of the nut 36.

When loads are applied to opposite ends of the karabiner body, the effect is to elongate the body and draw the free ends 14, 16 inwards. That has the effect of changing the angle of the ledges 44 with respect to the longitudinal axis of the gate to the extent that the ledges slope upwardly in the direction of opening of the gate rendering it more difficult for the gate to be opened inadvertently in a load situation. This is an important safety feature of the illustrated karabiner.

Furthermore, as can be seen, the free end 16 of the karabiner has a generally smooth profile, which advantageously can avoid the risk of snagging of ropes etc thereon.

Figures 18 to 31 show variations on the basic karabiner of Figures 1 to 17 and only the differences will be described in detail below. Like parts have been given the same reference numbers throughout for ease understanding.

In Figure 18 instead of a generally circular nut, nut 60 at the end of the gate 20 is generally semi-circular in side view. In Figure 19, the karabiner has a rectangular nut 64 at the end of the gate 20.

Figure 20 shows a karabiner with a different means of forming the slot for receiving the free end of the gate 20. The slot is provided by a wire cage 66

fixed to the free end of the body 12. The cage is formed of a wire bent to form two opposed U-shaped sides 68. The sides converge outwardly of the karabiner, so that nut 36 can snap into the cage but not pass through it. The nut can have annular grooves 70 either side of the gate to locate on the wire of the cage.

In Figure 21 of the drawings, the end 74 of the gate 20 is folded over sideways instead of using a nut and the slot 38 in the free end of the body is shaped to correspond to the shape of the end of the gate.

Figure 22 of the drawings shows a karabiner with slot 80 for the gate accessible from the side of the free end of the body. The gate has a slightly larger loop 82 at its free end that fits over peg 84 and into groove 86 in the top surface of the spigot. To open the gate, it has to be pulled sideways initially.

Figure 23 of the drawings is included to show a karabiner with a safety lock in the form of rotatable thimble 90 on the free end of the body. The thimble 90 has a slot 92 therein that when aligned inwardly with the gate allows the gate to be opened and to close but when rotated out of that alignment locks the gate closed.

In Figure 24 the gate of the karabiner has a nut 100 that is slid onto the gate. Figure 25 shows how the nut 36 used in the karabiner of Figure 1 may be formed in two parts, one male 102 and the other 104 female.

Turning to Figure 26 of the drawings, a karabiner of the type of Figure 1 has a sliding locking member 110 on the gate, so that when the gate is closed, the locking member 110 can be slid up towards the free end 16 of the body. The

locking member has a finger 112 that then overlies the body on the opposite side to the slot, so that the gate cannot be opened inadvertently.

Figure 27 of the drawings shows how the slot 38 may be shaped to correspond to the shape of the gate end. In this case, the gate end is in the form of a transverse loop 120 and the slot has a peg 122 therein, over which the loop locates.

In Figure 28, the slot 38at the free end of the body of the karabiner has a rotatable locking pin 130 through the end of the body. The gate has a loop 132 at its free end that locates over the pin. The pin has a lip 134, so that with the lip downwards as illustrated the loop 132 can locate on the pin but when the pin is rotated through 180°, the lip 134 prevents the loop 132 from being freed.

Figure 29 shows a locking thimble 150 provided on the gate. There is an outwardly screw-threaded sleeve 152 on the gate and the thimble is correspondingly threaded, so as to move upwards or downwards when rotated. When the thimble is moved upwards, it partly overlies the free end of the body, so that the gate cannot be opened.

Finally in Figure 30 of the drawings, a karabiner has a gate 20 with a loop 160 at its free end and there is a hole 162 through the free end 16 of the body in the region of the gate receiving slot 38, so that when the gate is closed the loop 160 and hole 162 coincide. A strap 164 attached to the gate has a pin 166 that can be pushed or sprung into the hole 162 and through the loop 160 to lock the gate closed.

It will be appreciated that whilst the above illustrated embodiments utilise

bent wire gates, it is possible to substitute such gates with conventional spring load gates, such as those constructed from metal bars or other suitable materials. The use of conventional gates is believed to be particularly applicable to the embodiment of Figure 20 but may also be applicable, for example, to the embodiments of Figures 26, 27, 28 and 30 of the accompany drawings.